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ABSTRACT

To create not a text-bound but a reader-based procedure for identifying global coherence within a discourse, five major writing tasks of 13 college students enrolled in a basic skills composition course were evaluated by three readers--doctoral students and faculty members in English and Reading Education. After choosing the five most and the five least coherent papers, the readers summarized the main ideas of these texts and identified the statements contributing to and detracting from their main ideas. Analysis of the readers' findings revealed no significant differences between highly coherent and highly incoherent papers in the percentage of statements contributing to global meaning. It did show, however, that the globally incoherent texts had a higher percentage of local incoherent statements and more frequently required readers to generate major inferences from these statements. Results indicated little reader agreement either on which propositions in the more incoherent papers were significant or irrelevant, or on the global meanings of any papers, coherent or not. The findings suggest that more coherent texts supply readers with a greater number of multiple cues for the building of meaning macrostructures and thus require fewer processing resources on the part of the reader. Because reading is a transactive process, however, the existence of multiple signs does not guarantee a shared understanding of even the most coherent texts. (MM)

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TEXT COHERENCE AS AN "IN-HEAD" PHENOMENON

Introduction

Both theoretically and pedagogically, the importance of global coherence for the successful comprehension and production of text has been much discussed within the reading and writing literature. If discourse is to be effective, it must be organized around a semantic 'core', topic, or theme. Theoretically, Halliday and Hasan (1980) have called coherence the enabling function since it allows one to organize the meanings being constructed. Beaugrande (1980) has proposed that performance in text processing depends on the extent of organization which the language user can impose on the data being formulated during the reading or writing act. Perhaps more than any other individual, van Dijk (1980) has demonstrated the critical role which global coherence serves in the generation of meaning. For van Dijk, global coherence is represented in a text's macrostructure, that higher-level semantic framework which organizes the 'local' microstructure of the text. Finally, from a pedagogical perspective, such instructional strategies as structured overviews, semantic mapping, and webbing techniques demonstrate the influence which the construct of global coherence has had on the educational community.

A fundamental question arises, however, in regard to the very nature of global coherence itself; that being, exactly what makes a coherent text coherent? Or, operationally stated, how can the global coherence of a text be identified? According to van Dijk (1980), the global coherence of any text can be objectively determined through the application of four macro operators

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which reduce, organize, and summarize the local data of the discourse. Stein (1978), Kintsch (1977) and Rumelhart (1975) have proposed that the macrostructure of a narrative can be ascertained through the identification of its key story grammar elements. They argue that all stories, if they are to be coherent, must contain these key components.

The limitation of text analytic techniques of these types are their formalistic, logical, and text-based natures. Coherence is perceived as an objective attribute of the discourse itself and is delineated through the use of text-based procedures. Violated is the notion of text and its coherence as a transactional process and ignored is the critical variable in the comprehending act, i.e. the reader. Coherence is not, this paper argues, indigenous to the text itself. It is not a text-bound attribute residing within the confines of the discourse, but rather an "in-head" phenomenon created through a transaction between the reader and the cues signed by the writer through the text.

Given this limitation of current text-based techniques for analyzing coherence, there is a need for a procedure which takes its cue from the reader. Global coherence and its attributes as defined by the reader constitutes the data to be presented within this study.

Data Collection and Analysis

A two-step, reader-based procedure was used to identify coherent and incoherent texts and to examine their key internal differences. Figure 1 contains the directions which readers followed when analyzing the texts. Texts were produced by thirteen students enrolled in a university basic skills composition course. The most and least coherent texts were identified from five major writing tasks which the students had experienced during the course of the semester. Texts were read and ranked in terms of their global coherence by three readers. Readers were doctoral students and faculty members in English and Reading Education.

Step One: Texts vary in the degree to which they cohere around an implicit or explicit central point or idea, i.e. in their conceptual unity. Read the following set of texts and rank order them from one to thirteen in terms of their global coherence, i.e. their general or overall coherence. On the coherence continuum, one should be the most coherent and thirteen the least.

Step Two: (Part A)

Read the text through and then generate a three to four sentence summary which you feel captures the implicit or explicit central point or idea the text intended to convey.

(Parts B and C)

Keeping the summary which you generated for each text in mind, re-read each text and complete the following directions.

1. Using the blue marker, highlight those portions of the text which were major and direct contributors to your summary.

2. Using the yellow marker, highlight those portions of the text which did not contribute to your summary because:

   a) these portions were irrelevant to the thrust of the text,

   b) meaning breaks down for you as a reader, i.e. there were gaps requiring the making of major inferences in order to establish meaning and maintain coherence, or

   c) meaning cannot be established.

   After identifying each of these portions, please indicate your reasons for highlighting it by putting the appropriate letter at the end of each portion. You may or may not find portions of the text which are incoherent with your summary.

3. All portions of the text left unmarked should be meaningful and relate directly or indirectly to your summary, but not be major contributors.

Figure 1. A reader-based system for text analysis.

After the global coherence ranking was completed, an average rank across readers was generated for each text. Based on these means, the five most and the five least coherent texts were identified. At the ends of the continuum, there was wide agreement among readers as to which texts were high and low in coherence.

The second step in the analysis procedure involved identifying those within-text factors affecting a reader's ability to generate global coherence when processing text, using the five high and five low in coherence papers pre-

viously identified. Each text was read by three readers and analyzed in several ways.

First, readers were asked to read each text and to generate a three to four sentence summary which captured the implicit or explicit central point which they felt the author intended to convey. After generating their summaries, readers highlighted in blue marker those portions in each text which were major and direct contributors to their summaries. In yellow marker, readers were asked to highlight portions which were incoherent with their summaries because they were 1) irrelevant to the thrust of the text, 2) required the making of a major inference so that meaning and coherence could be maintained, or 3) were found to be meaningless. All segments not highlighted were meaningful and related to the summaries, but were not major contributors.

Following the generation of the summaries and the markings of the texts, all texts and summaries were propositionalized using procedures developed by Turner and Greene (1977). The propositions from the texts and summaries were used to generate hypotheses concerning four aspects of coherence: 1) propositions contributing to coherence, 2) propositions contributing to incoherence, 3) the kinds of propositions contributing to text incoherence, and 4) the effect which coherent and incoherent texts had on the readers' ability to generate shared meanings in their summaries.

Results: Within-text Factors Affecting Coherence

Propositions Contributing to Coherence

In order to measure the propositions contributing to text coherence in the two text types, the number of propositions underlying portions marked in blue were identified for each text. The mean number of propositions highlighted by the three readers for all texts both high and low in coherence was then determined, a percentage generated, and the variance in mean percentages between the two groups calculated.

	HIGH COHERENCE	LOW COHERENCE	Significance
Mean Percentage of Contributing Propositions	.23	.23	NS
Percentage of Shared Contributing Propositions	.07	.03	$p < .01$
Mean Percentage of Incoherent Propositions	.04	.17	$p < .01$
Percentage of Shared Incoherent Propositions	0	.006	NS
Percentage of Disputed Propositions	.01	.07	$p < .01$

Figure 2. Summary of the factors contributing to coherent and incoherent texts.

Figure 2 represents the results of this measurement, as well as others within this study. As indicated in the first row, "Mean Percentage of Contributing Propositions", there was no significant difference, as measured by a pooled t test at the $p < .01$ level, in the overall percentage of propositions which readers had identified as contributing to their summaries. Texts high in coherence contained significantly no more such propositions than those low in coherence. As an isolated factor, percentage of contributing propositions was not a distinguishing characteristic between texts high and low in global coherence. Both

types of texts appear to contain salient propositions upon which readers are able to build macrostructures.

Also identified were those particular propositions which were highlighted as contributing to their summaries by all three readers. This was analyzed in order to ascertain whether or not coherent texts result in a convergence among readers as to which meanings are the most important to the overall thrust of the discourse. The analysis found, as indicated in row two of Figure 2, that the percentage of shared propositions did vary significantly between those two text types ($t=3.70$, $p < .01$). From the total of 315 propositions found in the five highly coherent texts, 7% were identified by all three readers as contributing to their summaries. For texts low in coherence, the match among propositions was 3%, based on a combined total of 301 propositions. Texts high in coherence, therefore, resulted in readers more often agreeing on which propositions were the most salient in terms of contributing to their macrostructures.

As interesting as the fact is that coherent texts allowed for more agreement among readers as to which segments of text were of prime importance, is the fact that so little agreement actually existed among either text type. For the most part, readers took radically different perspectives toward any given text, demonstrating the transactional nature of the reading process.

Propositions Contributing to Incoherence

The second aspect of coherence for which hypotheses were generated concerned those propositions which readers saw as contributing to text incoherence. The percentage of local propositions highlighted in yellow by the readers because they were found to be incoherent was calculated and measured in the same manner as was the percentage for propositions found to be main contributors to reader macrostructures. As row three in Figure 2 illustrates, there was a significant difference in the mean percentage of propositions found to be incoherent in high coherence texts and those texts low in coherence ($t=4.02$,

$p < .01$). On the average, only 4% of the local propositions in highly coherent texts were incoherent with the macrostructures generated by the readers. In contrast, 17% of all local propositions in texts low in coherence were found to be incoherent with the macropropositions of the readers.

Therefore, one within-text factor contributing to global coherence is a higher occurrence of local propositions which readers find incoherent with their macropropositions. This incoherence would indicate that these local propositions could not be as easily utilized during text processing and macrostructure generating. It also means that there exists a smaller proportion of propositions in these texts which support the building of macrostructures. While the mean number of propositions contributing to the macrostructures remained constant across text types, there appears to be much less data in the incoherent texts offering conceptual support to these propositions and their resulting macrostructures.

Though there existed a higher percentage of propositions found to be incoherent in texts low in global coherence, which propositions were highlighted as such varied across readers. As indicated in row four of Figure 2, there was virtually no agreement on which propositions were incoherent. In fact, readers can more easily agree on those propositions contributing to their macrostructures than they can on those which they find to be incoherent.

At this point in the analysis, several hypotheses can be made concerning those within-text factors affecting text coherence. First, all texts, whether high or low in coherence, contained equal proportions of propositions which readers can utilize as semantic cues for constructing macrostructures. Writers were either able to supply readers with signs, as expressed in propositions, contributing to the generation of macrostructures, or readers were able to impose such signs on the text. What does appear to distinguish coherent texts from those which readers find to be incoherent is the lack of conceptual

support for main and direct contributing propositions within incoherent texts. More coherent texts offer a greater variety and selection of propositions from which readers can construct a coherent whole.

Secondly, the high degree of incoherent propositions found within less coherent texts may require a higher degree of reader inferencing during discourse processing than would be necessary in more coherent texts. This inferencing would demand a higher degree of resources from the system and focus the reader's attention on extensive cognitive searches for the location and retrieval of data upon which such inferences could be made. In a sense, these heavy inferencing demands begin to turn the reader into the writer of the text. While there is probably a delicate and fine balance between those cognitive contributions made by readers and those made by writers, incoherent texts appear to violate this balance. In texts of this type, readers may be required to generate more meanings lacking textual support than they feel comfortable doing.

Thirdly, this high degree of inferencing necessary in incoherent texts might also result in more tentative text worlds. Since the writers of incoherent texts had supplied the readers with fewer text cues for building these worlds, readers must supply more of this information from their backgrounds. Given this heavy reliance on prior knowledge which processing these texts entails, the lack of propositional support for the construction of macropropositions, and the skeletal nature of the macrostructures which result, readers may feel less sure of their text worlds. Therefore, tentativeness and processing demands, rather than inability to gain meaning and generate macrostructures, may be the determining factors as to whether readers perceive a text as coherent or not.

Finally, texts high in coherence allow readers to more often agree on which meanings are the most important and salient to the overall structure of the text. These texts appear to supply readers with multiple cues allowing for

this mutual agreement. Agreement was not found, however, on which propositions readers perceived to be incoherent. It appears that incoherent propositions are not classified as such based solely on attributes within the text, but also on the knowledge which the reader brings to the page. In any particular text, different readers perceived different portions as being incoherent and varied in their ability or willingness to utilize certain propositions in constructing their global configurations of meaning as they processed text.

Kinds of Propositions Contributing to Incoherence

The third aspect of coherence which was examined in the study addressed itself to the exact nature of propositions which were found by readers to be incoherent in the two text types. When readers highlighted in yellow those portions of text which were incoherent with their macrostructures, they indicated one of three reasons for each marking. The reasons for the markings were tabulated, means generated across the three readers for each set of five texts, and pooled t tests calculated. Figure 3 contains the results of these analyses. As indicated in the figure, there was no significant difference between the mean percentage of propositions found to be irrelevant in either of the two text types. Each type contained almost the exact same percentage of irrelevant propositions.

	HIGH COHERENCE	LOW COHERENCE	Significance
Irrelevant to the Thrust of the Text	.03	.02	NS
Require a Major Inference	.02	.07	$p < .01$
Meaning cannot be Established	.003	.06	$p < .01$

Figure 3. The nature of propositions contributing to text incoherence.

A significant difference was found, however, in the percentage of propositions requiring major inferences ($t=3.90$, $p<.01$). Texts low in coherence contained more than three times (7% vs. 2%) as many propositions requiring such inferencing in order that meanings could be maintained than did texts high in coherence.

Finally, texts low in coherence contained a significantly larger percentage of propositions for which readers could generate no meaning whatsoever ($t=3.8$, $p<.01$). On the average, 6% of all propositions within texts low in coherence were found to be meaningless by readers as compared with only .003 in highly coherent texts.

The high degree of non-meaning bearing propositions in low coherent texts, combined with the larger number of propositions requiring the making of major inferences, adds further support to the hypothesis that macrostructure tentativeness is a major characteristic of incoherent texts. On an average, 13% of all propositions found within these texts did not afford readers direct cues for the construction of meaning. Readers were either required to add substantial amounts of information from their backgrounds to these propositions or simply had to resign themselves to the fact that no meaning could be constructed. Though readers are still capable of generating macrostructures from these texts, they may feel less comfortable with them, realizing the high percentage of propositions in the text not supporting their summaries.

Once again, however, it should be noted that there was almost no reader consensus as to exactly which propositions were irrelevant, which required the making of major inferences, or which were meaningless. Different readers formed different transactions with different texts and the meaningfulnes of any individual propositions became dependent on the meaning which the reader could generate from the supporting text and his or her background knowledge.

Even more interesting were those propositions which were disputed among

readers. Disputed propositions are those units of meaning which one reader had highlighted as being major and direct contributors to his or her macrostructure and another had marked as incoherent. When analysis of the texts was first initiated, the researcher had not anticipated the occurrence of such conflicts. However, as analysis of the data proceeded, such conflicts became readily apparent and were subsequently included in the evaluation of the texts.

As indicated in the last row of Figure 2, the mean percentage of disputed propositions was significantly greater for texts low in coherence at the $p < .01$ level ($t=3.70$). On an average, 7% of all propositions within low coherence texts were disputed by readers. This is in contrast to a mean of 1% for high coherence texts.

Given the greater occurrence of disputes within incoherent texts, it may be the case that for these texts, reader ability and/or willingness to make major inferences plays a role of greater importance than it does for more coherent texts. Particular readers may lack the background necessary to create meaning for certain portions of text and the writer may not supply enough textual cues to support such generation of meaning. Other readers may have the required background, but not feel comfortable using the inferred information to support their macrostructures. Finally, there may exist readers who have both the background upon which the inferences can be based and who also feel comfortable using these meanings upon which to generate their macrostructures.

Results: Coherence, Macrostructures, and Shared Meaning

The final aspect of coherence analyzed within this study concerned the relationship between text coherence and its influence on the construction of shared meanings among readers.

The degree to which readers shared meanings in their macrostructures required a multi-step procedure. First, propositions containing the same or similar meanings were identified across the three summaries for each of the ten

texts. Because the number of propositions varied across summaries, a simple percentage of shared propositions could not then be calculated. Instead, a percentage was generated for each of the three summaries per text. The percentage was based on the number of propositions within a summary which were semantically similar with propositions found within the other two summaries. The percentages of all three texts were then combined and a mean percentage generated.

Finally, the five mean percentages across each set of text types, coherent and incoherent, were averaged into a grand mean. The two grand means were used for calculating the differences in shared meanings between texts high and low in coherence, using a pooled t test. As Figure 4 illustrates, there was not a significant difference in shared meanings between texts high and low in coherence at $p < .01$ ($t=1.48$). Thirty-seven percent of all macropropositions generated from coherent texts were shared among readers and 26% of all propositions generated from incoherent texts. In fact, for no text, coherent or incoherent, did readers agree on the global meanings any more than fifty-one percent of the time. Readers were simply not able to agree upon what the global meanings of any text were to any great extent, each reader understanding the text differently. Therefore, at the macro level, coherent texts did not allow readers to converge in their shared understandings of text, based on a statistical analysis, any more than did texts which were less coherent.

	HIGH COHERENCE	LOW COHERENCE
Mean Percentage of Shared Macropropositions Across Readers and Summaries	.37	.26
t	1.48	
Significance	NS	

Figure 4. Shared reader generated macropropositions.

This finding was not a predicted one, given the fact that readers were more likely to utilize the same propositions for the construction of macrostructures on coherent texts (7%) than on incoherent texts (3%). While this difference was statistically significant, it appears not to be semantically significant in terms of allowing readers to generate more semantically similar macrostructures for coherent texts. Simply using the same propositions for the building of macropropositions does not guarantee that their synthesis will result in similar meanings. Other propositions exist in the text which indirectly support the evolving macrostructure. Given the existence of these propositions, as well as variation in reader background, shared meanings only exist to a limited extent, regardless of the coherence of the text.

Summary and Conclusions

In summary, what makes a text coherent is probably based on an optimal ratio between those cues supplied by the writer and those generated by the reader when processing the text. As reader background varies, so too will the degree to which the reader finds particular portions of a text coherent. As the cues laid out in the text by the writer vary, so too will coherence of the text for the reader. The data in this study suggests that coherent texts supply readers with multiple cues for the building of macrostructures and result in configurations of meaning which are less tentative, thus requiring fewer processing resources on the part of the reader. The existence of these multiple signs in coherent texts, however, do not result in a shared understanding of text. Reading, by its very nature, is a transactive process in which meanings are generated as well as maintained and writers cannot necessarily assume that their readers will understand their texts as intended just because they are coherent.

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